

# ESS1: Earth's Place in the Universe

## ESS1.A: The Universe and its Stars



1st Grade	5th Grade	7th Grade	Earth & Space Science
<p>Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.</p>	<p>The sun is a star that appears larger and brighter than other stars because it is closer.</p> <p>Stars range greatly in their distance from Earth.</p>	<p>Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models.</p> <p>Earth and its solar system are part of the Milky Way galaxy, which is one of the many galaxies in the universe.</p>	<p>The star called the sun is changing and will burn out over a lifespan of approximately 10 billion years.</p> <p>The study of stars' light spectra and brightness is used to identify compositional elements of stars, their movements, and their distances from Earth.</p> <p>Other than the hydrogen and helium, nuclear fusion within stars produces all atomic nuclei lighter than and including iron, and the process releases electromagnetic energy.</p> <p>Heavier elements are produced when certain massive stars achieve a supernova stage and explode.</p>

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## ESS1.B: Earth and the Solar System



1st Grade	5th Grade	7th Grade	Earth & Space Science
<p>Seasonal patterns of sunrise and sunset can be observed, described, and predicted.</p>	<p>The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.</p>	<p>The model of the solar system can explain eclipses of the sun and the moon.</p> <p>Earth's spin axis is fixed in direction over the shortterm but tilted relative to its orbit around the sun.</p> <p>The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year.</p> <p>The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.</p> <p>The solar system appears to have formed from a disk of dust and gas, drawn together by gravity.</p>	<p>The solar system consists of the sun and a collection of objects of varying sizes and conditions - including planets and their moons - that are held in orbit around the sun by its gravitational pull on them.</p> <p>Kepler's laws describe common features of the motions of orbiting objects, including their elliptical paths around the sun. Orbits may change due to the gravitational effects from, or collisions with, other objects in the solar system.</p> <p>Cyclical changes in the shape of Earth's orbit around the sun, together with changes in the tilt of the planet's axis of rotation, both occurring over hundreds of thousands of years, have altered the intensity and distribution of sunlight falling on the Earth. These phenomena cause a cycle of ice ages and other changes in climate.</p>

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## ESS1.C: The History of the Planet Earth



2nd Grade	4th Grade	8th Grade	Earth & Space Science
<p>Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe</p>	<p>Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes.</p> <p>The presence and location of certain fossil types indicate the order in which rock layers were formed.</p>	<p>The geologic time scale interpreted from rock strata provides a way to organize Earth's history.</p> <p>Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale.</p> <p>Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches.</p>	<p>Although active geologic processes, such as plate tectonics and erosion, have destroyed or altered most of the very early rock record on Earth, other objects in the solar system, such as lunar rocks, asteroids, and meteorites, have changed little over years. Studying these objects can provide information about Earth's formation and early history.</p>